INTRODUCTION

This report is the third of three publications containing results from the 1995 and 1996 cycles of the Survey of Industrial Research and Development. The first two publications, Data Briefs announcing the availability of survey results, contain analytical information and highlight the increase of industrial research and development (R&D) funded from companies' own resources during 1995 and 1996. This report, the Detailed Statistical Tables report, contains the full sets of statistics produced from the two cycles of the survey and provides statistics on research and development (R&D) funding for the years 1985–96 and on R&D personnel for the period from January 1986 to January 1997. (All three printed publications also are available on the World Wide Web at ***http://www.nsf.gov/sbe/srs/stats.htm***.)

This report provides national estimates of the expenditures on R&D performed within the United States by industrial firms, whether U.S. or foreign owned. Among the statistics are estimates of total R&D, the portion of the total financed by the Federal Government, and the portion financed by the companies themselves or by other non-Federal sources such as State and local governments or other industrial firms under contracts or subcontracts. Total R&D is also separated into its character-of-work components: basic research, applied research, and development. Other statistics include R&D financed by a domestic firm but performed outside the United States, R&D contracted to organizations outside of the firm, and the funds spent to perform energy-related R&D. This report also provides statistics on domestic net sales, number of employees, number of R&D-performing scientists and engineers, and cost per R&D scientist and engineer.

The Survey of Industrial Research and Development is an annual sample survey that intends to include or represent all for-profit, R&D-performing companies, either publicly or privately held. The survey's primary focus is on U.S. industry as a performer of, rather than as a source of funds for, R&D. Thus, data on Federal support of R&D activities performed by industry are collected and resulting statistics appear in several tables, but statistics on industrial funding of R&D undertaken at universities and colleges and other nonprofit organizations are not collected and therefore are not included in the tables.[1] The result of collecting and publishing performer-reported statistics is that the federally funded R&D performance totals presented in this report differ from the Federal R&D funding totals reported by the Federal agencies that provide the funds and data for the statistics published in NSF's *Federal Funds for Research and Development* report series. One reason for these differences is that performers of R&D often expend Federal funds in a year other than the one in which the Federal Government provides authorization, obligations, or outlays. (For definitions of these terms, see section C under Comparisons to Other Statistical Series.) During the past several years, the differences have widened between the Federal R&D funding reported by performers and that reported by funding agencies. These differences are documented and analyzed in *National Patterns of R&D Resources: 1996* (NSF 96-333).

Industry statistics in this report are developed from data collected from individual companies.[2] Since the survey is company based rather than establishment based, all data collected for the various subparts of each company (plants, divisions, or subdivisions) are tabulated in the major standard industrial classification (SIC) of the company. The resulting industry estimates are reported using the SIC of the companies within each industry. National totals are estimated by summing the industry estimates.

Prior to the 1994 cycle of the survey, all companies that spent more than $1 million annually on R&D in the United States or had 1,000 or more employees received a survey questionnaire every year. Beginning with the 1994 cycle, the employee cutoff was dropped from the criteria, and beginning with the 1996 cycle, the R&D level was raised to $5 million. For all cycles of the survey, the remaining firms (i.e., those that are not considered

[1] Data on R&D performed at universities and colleges are collected in the annual Survey of Research and Development Expenditures at Universities and Colleges. Resumption of a survey of other nonprofit organizations, discontinued in the mid-1970's is underway. More information about these surveys is available from NSF's Research and Development Statistics Program in the Division of Science Resources Studies at the address given at the end of this introduction.

[2] In this survey and in the publications presenting statistics resulting from the survey, the terms company, firm, and enterprise are used synonymously.

"certainties" because of the selection criteria) are subjected to probability sampling and may or may not receive a questionnaire for a given survey year. Among the organizations purposely excluded from the survey are trade associations and not-for-profit consortia. Although their primary mission is to serve industry, these associations are established as nonprofit organizations.

Respondents receive detailed definitions to help them determine which expenses to include or exclude from the R&D data they provide. Nevertheless, the statistics presented in this report are subject to response and concept errors caused by differences in the way respondents interpret the definitions of R&D activities and by variations in company accounting procedures.

The National Science Foundation's (NSF's) Division of Science Resources Studies has sponsored and managed a survey of industrial R&D since 1953. The 1953–56 surveys were conducted by the Bureau of Labor Statistics (BLS), U.S. Department of Labor.[3] Since 1957, the Bureau of the Census, U.S. Department of Commerce, has conducted the survey.[4] Census staff conduct the survey under title 13 of the United States Code, which prohibits publication or release of data or statistics that may reveal information about individual companies. Therefore, in some tables of this report the symbol "(D)" is used as a footnote reference to indicate that estimates are being withheld to avoid possible disclosure of information about operations of individual companies.

The content of the survey has been expanded and refined over the years in response to an increasing need by policymakers for more detailed information on the Nation's R&D effort. For example, questions on energy R&D were added in the early 1970's, following the first oil-shortage crisis. On the other hand, the frequency of collection of certain data items has been reduced in recent years in an attempt to alleviate some of the respondent burden that has been placed on industry from all sources. For large firms known to perform R&D, a detailed questionnaire, form RD-1L, is used to collect data for odd-numbered years and an abbreviated version, form RD-1S, is used to collect data for even-numbered years. To further limit the reporting burden on small R&D performers and on firms that are included in the sample for the first time, an even more abbreviated form, form RD-1A, which collects only the most crucial data, is used each year.

Several changes have been made to the survey since the early 1990's that are of special importance to users of this report. Prior to the 1992 survey, statistics were based on samples selected at irregular intervals (i.e., 1967, 1971, 1976, 1981, and 1987). In intervening years, a subset of the last sample, a panel, was used. The most recent sample prior to the 1992 survey was selected and first used for survey year 1987. Original estimates for 1988 through 1991 were based on surveys of approximately 1,700 panel companies that reported R&D activity in the 1987 survey. Beginning with the 1992 survey, statistics were based on samples selected annually. Also, beginning with the 1992 survey, the sample size was increased from approximately 14,000 to approximately 25,000 firms. Annual sampling and the increase in sample size were instituted for several reasons: (1) to account better for births of R&D-performing establishments in the survey universe; (2) to more fully and accurately survey R&D performed by nonmanufacturing firms, especially in the service sector; and (3) to gather more current information about potential R&D performers.

Tables containing the statistics resulting from the 1995 and 1996 cycles of the survey are provided in section A. Detailed information about the history of the survey, survey methodology, comparability of the statistics, survey definitions, and other technical notes are provided in section B. Survey questionnaires, instructions, and other survey documents are reproduced in section C. Specific questions regarding the survey may be directed to Raymond Wolfe at (703) 306-1772, via e-mail at rwolfe@nsf.gov (Internet), or at the following mailing address:

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[3] See National Science Foundation, *Science and Engineering in American Industry: Final Report on a 1953–54 Survey* (NSF 56-16) and *Science and Engineering in American Industry: 1956* (NSF 59-50) (Washington, DC: Supt. of Documents, GPO, 1956 and 1960).

[4] Data obtained in the earlier BLS surveys are not directly comparable with Census figures because of methodological and other differences.